

REMARKS

Claims 1-11, 16, 17, 19, 21-32, 34-39, 41-76, and 85 are pending in the application.

The Examiner has withdrawn Claims 19, 21-22, 25-27, 29-32, 36, 38-39, 41-43, 50-54, 59, and 61 as being drawn to a non-elected species.

Rejection of Claims Under 35 USC § 102(b) (Mallik)

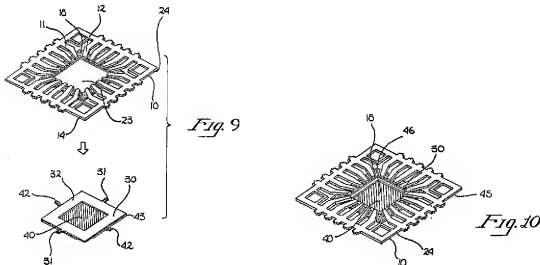
The Examiner rejected Claims 1 and 85 under Section 102(b) as anticipated by USP 4,891,687 (Mallik). This rejection is respectfully traversed.

The Examiner maintains that Mallik discloses each of the elements of the claims, stating as follows (at page 3):

As to claims 1 and 85, Mallik discloses a semiconductor device and method having a substrate 30 and a molded stiffener 31 (fig. 9) molded onto and secured to the substrate 30 without attachment with an adhesive element. (see fig. 9 and fig. 12)

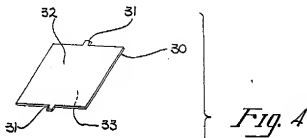
The Examiner has mischaracterized Mallik's disclosure.

The Examiner cites to substrate 30 and element 31 in FIG. 9.



Referring to FIG. 9, assembly 24 is now mated to assembly 43 such that tape 18 is sandwiched between leadframe 10 and plate 30. The completed assembly 45, having a center area 46, is shown in FIG. 10. ...

The fabrication of metal plate 30 and tabs 31 is described with reference to FIG. 4. Substrate 30 is a metal plate that is stamped to form tabs 31. See Mallik at col. 3, lines 41-48 and FIG. 4 below (emphasis added):



Referring to FIG. 4, a metal plate 30 is stamped to have dimensions substantially similar to the dimensions of tape 18 of FIG. 1. Plate 30 of the preferred embodiment is formed from a copper material and is silver plated on one surface 32. Plate 30 includes tabs 31 which will mate with appropriate leads 11 of leadframe 10 of FIG. 3. Tabs 31 are raised slightly from the plane of plate 30. Tabs' 31 surfaces are treated by a metallurgical process, such as gold or nickel plating, to help bond tabs 31 to leadframe 10. The preferred embodiment uses gold plating on tabs 31. Then, tape 35 having polyimide adhesive on both sides is cut to match the dimensions of plate 30 and then by the use of the polyimide adhesive as previously explained in reference to FIG. 1 is mated to the non-plated side 33 of plate 30 by the hot tack process. The resulting attachment of plate 30 to tape 35 is shown in FIG. 5 as unit 37.

Tabs 31 of Mallik's device are formed by stamping a metal plate 30. Metal stamping processes use dies and punches to cut the metal into the required shape. See, for example, <http://www.zycon.com/Design-Info/Stampings/Metal-Stampings.asp>.

The American Heritage® College Dictionary, 3rd Ed., Houghton Mifflin Co., Boston, MA (1993) at page 1324, defines the term "stamping" as follows:

stamp (stämp) v. **stamped, stamp-ing, stamps.** ...5. To form or cut out by application of a mold, form, or die...— n. 2a. An implement or a device used to impress, cut out, or shape something to which it is applied. B. An impression or a shape formed by such an implement or device....

Tabs 31 are not "molded" elements and are not "molded onto and secured to" metal plate 30.

Rather, tabs 31 are formed by stamping or cutting the metal material 30 – for example, by using a punch or die to cut the metal plate 30 to form projections that are integral to plate 30.

Clearly, Mallik does not teach or suggest Applicant's device as claimed in which a stiffener element is molded onto and secured to a substrate without attachment with an adhesive element. Accordingly, withdrawal of the rejection of Claims 1 and 85 is respectfully requested.

Rejection of Claims Under 35 USC § 103(a) (Mallik with APA, Culnane)

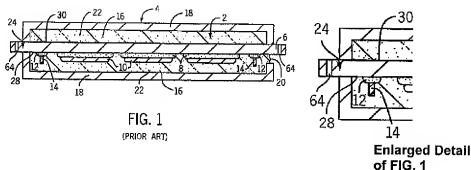
The Examiner rejected Claims 9-11, 16-17, 23-24, 28, 34-45, 44-45, 48-49, 55-58, 60, and 62-76 as obvious over Mallik in view of "Admitted Prior Art" (APA), citing to Applicant's FIGS. 1-2 and specification at pages 1-2. The Examiner rejected Claim 47 as obvious over the Mallik in view of APA, further in view of USP 6,517,662 (Culnane), citing to Culnane at col. 6, lines 34-50. These rejections are respectfully traversed.

The Examiner admits that Mallik does not disclose a "stiffener" made of a thermoplastic material, but contends that it would be obvious to modify Mallik's device with a thermoplastic/thermosetting material for the "stiffener" in order to provide a cheaper material.

With respect to Claim 47, the Examiner admits that Mallik and APA do not teach a "stiffener" bonded to the substrate by heating, cooling, and curing, but that it would be obvious to do so based on Culnane.

It is assumed that the Examiner is citing APA solely for the teaching of a stiffener formed of a plastic material.

However, it is again pointed out that in the teaching of a plastic stiffener 14 -- the APA teaches attaching the stiffener 14 to substrate 6 by *adhesive element 12* -- as described in the specification at page 1, lines 12-20 (emphasis added), and illustrated in Applicant's FIG. 1 below -- see particularly, the enlarged detail.



Referring to FIG. 1, a *prior art semiconductor die package 2* disposed within a package mold 4 is shown. Package 2 typically comprises a lead frame 6 (or other substrate), adhesive element 8, one or more dies 10, *adhesive element 12*, a *metal or plastic stiffener 14*, and an encapsulating material 16...

The package illustrated in FIG. 1 can be assembled by first constructing a die assembly 24. ...After die assembly 24 is assembled, *plastic or metal stiffener 14* is *secured to lead frame 6 of die assembly 24 with adhesive element 12*,

One skilled in the art reading Mallik's disclosure would not form either plate 30 or tabs 31 of Mallik's device from a plastic material.

Plate 30 forms the ground plane of the device. Tabs 31 of Mallik's device are ground tabs to mate with appropriate leads 11 of leadframe 10 to couple the ground plane 53. Mallik particularly teaches the plate 30 and tabs 31 are metal (e.g., copper) formed by stamping metal plate 30, the tabs 31 being metal plated.

See FIG. 4 (below) and Mallik's description of plate 30 and tabs 31 at col. 2, lines 35-36, and at col. 3, lines 41-51 (emphasis added).

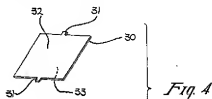
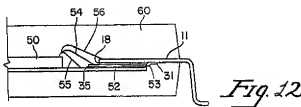
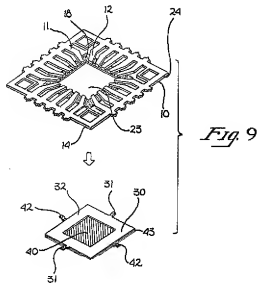


FIG. 4 shows a ground plane and a second adhesive coated insulation tape.

... Referring to FIG. 4, a metal plate 30 is stamped to have dimensions substantially similar to the dimensions of tape 18 of FIG. 1. Plate 30 of the preferred embodiment is formed from a copper material and is silver plated on one surface 32. Plate 30 includes tabs 31 which will mate with appropriate leads 11 of leadframe 10 of FIG. 3. Tabs 31 are raised slightly from the plane of plate 30. Tabs' 31 surfaces are treated by a metallurgical process, such as gold or nickel plating, to help bond tabs 31 to leadframe 10. The preferred embodiment uses gold plating on tabs 31. ...

See also FIGS. 9 and 12 (below), and Mallik's description at col. 4, lines 9-33 and 43-55 (emphasis added).



Referring to FIG. 9, assembly 24 is now mated to assembly 43 such that tape 18 is sandwiched between leadframe 10 and plate 30. ...In the preferred embodiment, plate 40 forms a power plane 52 and plate 30 forms a ground plane 53.

...
The tabs 31 and 42 when properly formed will extend past the outer boundary of tape 18. Due to the slight rise, the tabs 31 and 42 will extend from its respective plates 30 and 40 to mate with various corresponding leads 11 along their underside. The tabs 31 and 42 are bonded to the leads 11 by using one of various prior art methods, such as parallel gap welding, ultrasonic bonding, compliant bonding, wobble bonding, or thermo-compression (pulsed solder reflow).

...
Referring also to FIG. 12, the proper positioning of the various tabs 31 and 42 in the earlier formation of the ground and power planes is apparent in that tabs 31 and 42 mate with appropriate leads 11 to couple the ground plane 53 and the power plane 52. In the preferred embodiment, tabs 31 and 42 are bonded prior to the placement of wires 54-56 as earlier described. Although only one of the ground plane tabs 31 is shown in the FIGS. 11 and 12, the other ground tabs 31 and power tabs 42 are mated to their respective leads 11 in an equivalent manner. The various wire bondings are accomplished by bonding wires 54-56 to the silver spot-plated planes 52-53 and to the silver-plated lead tips 12.

One skilled in the art reading Mallik would have no motivation to form tabs 31 of a polymer material.

Furthermore, even if, *arguendo*, one were to form tabs 31 of a polymer material,

- based on the teaching of the APA, an art worker would adhesively attach plastic tabs 31 to plate 30;
- OR -
- based on Mallik's teachings, an art worker would be required to completely modify plate 30 from a copper plate to a *plastic plate*, and then stamp the plastic plate to form plastic tabs 31.

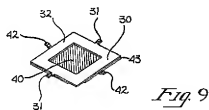
Neither of these configurations provide Applicant's invention as claimed - of a device having a stiffener that is *molded onto and secured to a substrate without attachment with an adhesive element.*

Regarding the rejection of Claim 24, the Examiner stated as follows (Office Action at page 5; emphasis added):

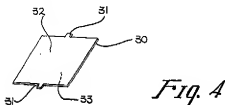
As to claim 24, Mallik teaches the semiconductor device having a substrate 30 (fig. 9) *and a stiffener 31 molded to the first surface of the substrate 30 (fig. 9).*

The Examiner's statement is in error.

FIG. 9 (below) does not teach tab 31 *molded to the surface of the substrate 30*.



As discussed above, with reference to FIG. 4 (shown below), metal plate 30 is stamped (cut) to form tabs 31. See Mallik at col. 3, lines 41-48.

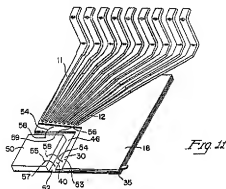


Regarding the rejection of Claims 34-35 and 60, the Examiner stated as follows (Office Action at page 5; emphasis added):

As to claims 34-35 and 60, Mallik's semiconductor device has ...*index holes* (fig. 11) for handling...

None of the rejected claims recite "index holes."

Nor does Fig. 11 of Mallik illustrate index holes. Fig. 11 shows a portion of the assembly of Fig. 10 and the bonding of an integrated circuit and some of its terminal connections.



Finally, with regard to Claim 47, for the above-stated reasons regarding the failure of Mallik combined with APA to teach the claimed devices, Culnane's disclosure does not overcome those deficiencies to provide Applicant's device as claimed.

As discussed above, Mallik teaches forming tabs **31** by stamping (cutting) copper plate **30**. There is no motivation to secure a material to the copper plate **30** of Mallik to form tabs **31**.

And APA teaches adhesively attaching a stiffener **14** to a substrate.

Likewise, Culnane describes bonding a stiffener **10** using an adhesive 20 attachment.

Culnane does not teach forming a stiffener by applying a material onto a substrate and hardening the material by heating, cooling, or curing. Rather, Culnane teaches applying heat and pressure to cure the adhesive 20 – which attaches the stiffener material **10** to substrate **4**.

See Culnane at col. 6, lines 5-51 (emphasis added), and FIG. 2 below.

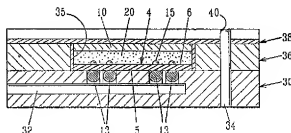


FIG. 2

Turning to the process of fabricating the chip carrier assembly 1, especially the bonding of the flexible substrate 4 to the stiffener 10, attention is directed to FIG. 2. ...A microporous adhesive 20, composition cut to the size of the flexible substrate 4, is disposed over the top surface 6 of the substrate 4. A stiffener 10 is placed over the adhesive 20 composition by means of a locator plate 36. A compression plate 38 is disposed over the stiffener 10 and the locator plate 36. Alternatively, the microporous adhesive composition 20 can be aligned and laminated to the stiffener 10. The laminated stiffener is thereupon placed over the flexible substrate 4, again by means of the locator plate 36. ...

The stiffener 10 is bonded to flexible substrate 4 by means of the application of heat and pressure. The assembly, disposed in the vacuum fixture 30, is subjected to heat and pressure to cure the curable adhesive disposed in the pores of the microporous film. The thermodynamic conditions imposed in the curing step *is a function of the specific curable adhesive employed in the curable composition*. ...

Mallik, either alone or combined with APA and/or Culnane, does not teach or suggest Applicant's invention as claimed. Accordingly, withdrawal of this rejection of the claims is respectfully requested.

Rejection of Claims Under 35 USC § 103 (Mallik with Lim)

The Examiner rejected Claims 2-8, 11, and 37 as obvious over the Mallik in view of USP 6,020,221 (Lim). This rejection is respectfully traversed.

The Examiner asserts that it would be obvious to modify Mallik's device with the various materials taught by Lim.

Claims 2-8 and 11 depend from Claim 1, and Claim 37 depends from Claim 34.

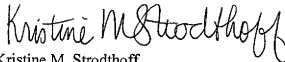
For the reasons stated above regarding the failure of Mallik to teach the claimed devices, Lim's disclosure does not overcome the deficiencies of Mallik to provide Applicant's device as claimed. As stated above, Mallik teaches a plate **30** with tabs **31** that are formed by stamping (cutting) plate **30** – not by molding tabs onto a substrate as claimed. Lim's disclosure does not correct that deficiency.

Accordingly, withdrawal of the rejection of Claims 2-8, 11, and 37 is respectfully requested.

Extension of Term. The proceedings herein are for a patent application and the provisions of 37 CFR § 1.136 apply. Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that Applicant has inadvertently overlooked the need for a petition for extension of time. If any extension and/or fee are required, please charge Account No. 23-2053.

It is respectfully submitted that the claims are in condition for allowance and notification to that effect is earnestly solicited.

Respectfully submitted,



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